

Biological Evaluation Amendment For
Prescribed Burning in the Horse Heaven Burn Unit

George Washington and Jefferson National Forests Mount Rogers National Recreation Area
Wythe County, Virginia

A Biological Evaluation/Biological Assessment (BE) was signed for the Prescribed Burning in the Horse Heaven by Cecil Thomas, Area Wildlife Biologist on February 20, 2004. The Biological Evaluation has been reviewed and an amendment is needed due to the addition of several new species added to the Regional Foresters Sensitive Species list and several new federally threatened and endangered species. Determinations can be found in the updated OAR table in Appendix A.

The analysis process carried out for this amendment follows the same step-down process conducted in the original BE. It uses information gained during previous literature reviews, field experience, and/or fieldwork conducted in preparation of the original BE (as described below). The results of this review, species-by-species, are documented in the attached list (See OAR table). This review came to the same determinations at the previous BE. However, the northern long-eared bat and candy darter were not federally listed species when the original BE was written so more evaluation is needed on this species. Also some regional forest sensitive species were not included during this time including eastern small-footed bat, tricolored bat, monarch, and regal fritillary which will be addressed further in this document. Implementing the project **may impact** but is **not likely to trend towards federal listing** for sensitive species identified by an OAR code of 6. All other species were addressed in the previous document.

The treatment areas and methods used for the current proposed prescribed burning will be the same as in the previous document.

Species Reviewed

Federally listed threatened and endangered species, species proposed for federal listing, and Southern Region sensitive species (TES) that may potentially be impacted by this project were examined using the following existing available information:

1. Reviewing the list of TES plant and animal species known, or likely to occur, on the George Washington and Jefferson National Forests, and their habitat preferences. This review included the current list of federal endangered, threatened, and proposed species for the Forest, the list generated by the U.S. Fish and Wildlife Service Information for Planning and Conservation (IPaC) screening tool for the project area, and the current Southern Region Sensitive Species list for the Forest dated January 1, 2002, with Forest-specific updates current as of March 15, 2019 (list attached as Appendix A).
2. Consulting element occurrence records (EORs) for TES species as maintained by the Virginia Division of Natural Heritage (VDNH), and supplied to the Forest.

3. Consulting species information, including county occurrence records, as maintained by the Fish and Wildlife Information Service (VAFWIS) of the Virginia Department of Game and Inland Fisheries (VDGIF).
4. Consulting with individuals in the private and public sector who are knowledgeable about the area and its flora and fauna.
5. Reviewing sources listed in the reference portion of this report.
6. Reviewing the results of past field surveys that may have been conducted in the area.

Most TES species known to occur on the Forest have unique habitat requirements, such as shale barrens, rock outcrops, bogs, caves, and natural ponds. Information gathered, analyzed, and presented in the Southern Appalachian Assessment dated July 1996 states that approximately 84% of threatened and endangered species and 74% of sensitive species are associated with rare or unique habitats, often referred to as rare communities. The BE completed for the Revised Jefferson Forest Plan, dated December 5, 2003, found that 87% of the sensitive species on the Jefferson NF are associated with rare communities or aquatic habitats.

Through cooperative agreements between the Forest and VDNH, Special Biological Areas have been identified and delineated on the Forest. These include rare and significant natural communities and vegetative types. These areas reflect current knowledge of the location, management, and protection needs of rare species and associated significant natural communities on the Forest. These areas are identified in the 2004 Jefferson National Forest Revised Forest Plan (Plan), pages 3-27 through 3-30, as Botanical and Zoological Areas (Management Area 4D). No Management Area 4D areas are within the proposed project area.

The need to conduct site-specific surveys of TES species for this project was assessed. Based on this assessment, affected potential habitat in the project areas was surveyed for TES species. Appendix A of this document lists all 194 TES species currently known, or expected to occur, on or near the George Washington and Jefferson National Forests. All species on the list were considered during the analysis for this project.

A “step down” process was followed to eliminate species from further analysis and focus on those species that may be affected by proposed project activities. Species not eliminated are then analyzed in greater detail. Results of this step-down analysis process are displayed in the Occurrence Analysis Results (OAR) column of the table in Appendix A. First, the range of a species was considered. Species’ ranges on the Forest are based on county records contained in such documents as the “Atlas of the Virginia Flora,” but are further refined when additional information is available, such as more recent occurrences documented in scientific literature or in Natural Heritage databases. Many times, range information clearly indicates a species will not occur in the project area due to the restricted geographic distribution of most TES species. When the project area is outside a known species range, that species is eliminated from further consideration by being coded as OAR code "1" in the Appendix A table.

This habitat is comprised primarily of mixed hardwoods/pine include oaks, maples, white pine, hemlock, and yellow pine with a midstory/understory of mountain laurel, rhododendron, white pine, hardwoods, recurved fedderbush, and vaccinium spp. The goal of this prescribed burn is to reduce fuel loading, improve habitat conditions for fire adapted species, improve wildlife habitat, and control the encroachment of white pine.

Northern Long-eared Bat

Introduction

This species was listed as threatened on April 2, 2015 due to rapid population declines caused by White

Nose Syndrome (WNS). The range of the northern long-eared bat includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. In Virginia, the Northern Long-eared bat (NLEB) was known to occur in every county of the state and prior to WNS was the most commonly captured bat in summer mist-net surveys.

As indicated by its common name, the NLEB is distinguished from other *Myotis* species by its relatively long ears (average 17 mm (0.7 in) that, when laid forward, extend beyond the nose up to 5 mm (USDI, 2015b). The NLEB is insectivorous and migratory, hibernating in caves and mines during the winter and occupying forests in the summer for feeding and reproduction (USDI, 2016). They typically use large caves or mines with large passages and entrances, constant temperatures, and high humidity with no air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. During winter hibernation in hibernaculum, NLEB are difficult to locate in bat survey efforts (pers. com. with Rick Reynolds, VDGIF 2019). In hibernacula they are found in small crevices or cracks, often with only the nose and ears visible.

During summer, northern long-eared bats roost singly or in colonies often in cavities, or in crevices, of both live and dead trees. This bat seems opportunistic in selecting roosts, using tree species based on suitability to provide cavities or crevices. It has also been found, rarely, roosting in structures like barns and sheds. In late spring pregnant females fly to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies, with young, generally have 30 to 60 bats, although larger maternity colonies have been observed (USDI 2015b, USDI 2016). Most females within a maternity colony give birth around the same time, which may occur from late May or early June to late July, depending where the colony is located within the species' range. Young bats start flying by 18 to 21 days after birth. Adult northern long-eared bats can live up to 19 years. Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation. This bat also feeds by gleaning motionless insects from vegetation and water surfaces (USDI 2015b, USDI 2016).

The USFWS completed a Biological Opinion (BO) on August 5, 2015 for the continued implementation of Forest Plans in the Southern Region, including the George Washington & Jefferson NFs, related to effects on the northern long-eared bat. The BO relied on continued implementation of existing Forest Plans and excepted activities as described in the April 2nd listing and associated interim 4(d) rule. On January 14, 2016 the FWS published the NLEB final 4(d) rule and it went into effect February 16, 2016. On February 11, 2016 the Southern Region of the Forest Service informed the FWS that the Forest Service will be implementing the NLEB final 4(d) rule using the voluntary process outlined in the January 5, 2016 Biological Opinion associated with the final 4(d) rule in lieu of the August 2015 BO specific to Forest Service activities.

Direct, Indirect, and Cumulative Effects

Because the burns would be conducted during the dormant season, it is unlikely that there would be direct effects to this species. Individuals would be in at their hibernation sites not present in the burn area. NLEB could be impacted negatively by indirect effects in the short term. Potential summer roost trees, especially current snags, could be burned up as result of implementing the prescribed burn and could reduce the amount of currently suitable roost trees. Burning, however, would create new roost trees to be used in the future, and improve foraging habitat for this species. Research has shown that prescribed fire in previously closed-canopy forest stands increases foraging bat activity (Cox et. Al, 2016). No cumulative effects are expected as a result of implementing this project.

Prescribed burning is an activity that is excepted from incidental take prohibitions in the final 4(d) rule. None of the 1,060 acres proposed for prescribed burning is within 0.25 mile of a known hibernacula or within 150 feet of a known, occupied maternity roost tree and is therefore excepted pursuant to the final 4(d) rule and associated Biological Opinion.

Determination of Effects

The determination of effect for the proposed project activities to the Northern long-eared bat is: ***May affect, likely to adversely affect***. However, there are no effects beyond those previously disclosed in the programmatic biological opinion on implementing the final 4(d) rule dated January 5, 2016. Any taking that may occur incidental to this project is not prohibited under the final 4(d) rule (50 CFR §17.40(o)). This project is consistent with the Forest Plan, the description of the proposed action in the programmatic Biological Opinion, and activities that do not require special exemption from taking prohibitions applicable to the northern long-eared bat; therefore, the programmatic biological opinion satisfies the Forest Service's responsibilities under ESA section 7(a)(2) relative to the northern long-eared bat for this project. Management activities will improve foraging habitat for NLEB within the foraging distance for bats from the two caves located outside the project area, and indirectly benefit the NLEB.

Eastern Small-footed Bat

Introduction

The eastern small-footed bat (ESFB) is known or likely to occur in 32 Virginia counties and ranges from New England south to northern Georgia and west to Oklahoma. During the winter this bat species hibernates in caves. During the late spring, summer, and early fall ESFB forage at night in forest and open woodland habitat, usually along ridge crests, and roost during the day in crevices of large rock outcrops and cliffs. ESFBs are potentially present and roosting during summer months wherever large rock outcrops or cliffs are present (USDA, 2014). There are no known caves with the microclimate suitable for bat winter hibernation located within the NSM project area.

The most serious threat to bats in eastern North America is white-nose syndrome (WNS), an often (but not always) lethal condition caused by a fungal pathogen that attacks hibernating bats. WNS has spread rapidly and now has been documented throughout the range of ESFB, and can affect this species (NatureServe, 2019). However, USFWS (2013) reviewed available information on population trends and WNS effects on small-footed bats and concluded that WNS does not appear to have caused significant population declines in hibernating ESFB.

Direct, Indirect and Cumulative Effects

Although preferred habitat for this species (rock outcrops, cliffs) the preferred roosting habitat for this species could fall within the prescribed fire unit. Though smoke could cause avoidance within the burn area briefly, fire does not carry within rocky ground conditions. Thus, adverse direct impacts to individual bats or their roosting habitats are not anticipated from implementation of the

proposed activities. The proposed Rx fire would create forested openings, while maintaining 99% of the riparian buffers where these bats are known to forage (NatureServe, 2020). This species could indirectly benefit from Rx burn implementation via more efficient foraging due to reduced midstory clutter (Cox et al. 2016) and increased insect abundance and diversity. In addition, the Forest standards designed to benefit Indiana bats and northern long-eared bats will also benefit small-footed bats.

USFWS (2013) determined that although several activities, such as construction of physical barriers at cave accesses, mining, flooding, vandalism, development, and timber harvest may modify or destroy ESFB habitat, these activities do not have significant, population-level effects on the species. Cumulative effects to WNS such as climate change, contaminants, and prescribed burning are not believed to be causing population declines in ESFB either (USFWS 2013).

Determination of Effects

Considering the information listed above, eastern small-footed bats may occur in the project area, and foraging habitat would be positively affected in the short-term, the determination of effect for this species for the proposed actions is, ***“may impact individuals but not likely to cause a trend to federal listing or a loss of viability”***.

Tricolored Bat

Introduction

Effects to tricolored bats were considered in this BE because this area is likely to support occurrences of the tricolored bat and habitat features found in the project area could be utilized by this species. Tricolored bats have a widespread range across the eastern United States and southeastern Canada, south into Central America, extending west into the central Great Plains. This species is a small bat, reaching 3½ inches in length and has a wingspan of just over 9 inches. The fur color is variable, but typically is a reddish brown to yellowish brown, slightly lighter on the belly. Its back fur is unique being tricolored -- gray at the base, tan in the middle, and dark-tipped. The wing membranes are blackish, but the skin covering the larger wing bones, including the forearm, is flesh colored (NatureServe 2020).

Tricolored bats will hibernate in a variety of sites including mines, rock shelters, and quarries, but they use caves most frequently. They are typically found hanging singly from the ceiling or along a wall. The bats prefer relatively warmer and more humid portions of caves for hibernation. They often have water droplets condensed on their fur that can make them sometimes appear white when a light is shined on them (VDGIF, 2019a).

Although most summer roosting sites are unknown in Virginia or West Virginia, this species has been observed roosting in high tree foliage, often in clumps of dead leaves or needles, in tree crevices and cavities, and human constructed structures such as buildings, homes, barns, sheds and bridges. Males likely roost in trees and/or manmade structures during summer. (VDGIF 2019a, NatureServe 2020). At maternity colonies, one to two pups are born to each female during June. There are currently no known maternity colony or roosting sites in Virginia (see Appendix B –

Tricolored Bat Winter Habitat & Roosts Application map, DGIF 2019b).

Tricolored bats are insectivores that feed almost entirely on small flying insects they capture along woodland edges, as well as along waterways and riparian areas, near forested habitat (NatureServe 2020). They forage in relatively small areas, at treetop level, usually over watercourses, and they are never found in deep woods or open fields unless large trees are nearby (VDGIF, 2019a). Suitable habitat for tricolored bat is known to occur on all GWJNF Districts and counties, and can be assumed to occur within the NSM project working areas.

Once one of our most common bat species, tricolored bats have experienced substantial declines across Virginia and West Virginia, since the discovery of white-nosed syndrome (WNS) in 2009. This bat occurred commonly across GWJNF area in summer and during migration (NatureServe, 2020) before these population declines (pers com. Rick Reynolds DGIF). A few years ago, the population impact of WNS on tricolored bats appeared to be less severe than it was initially, but recent data indicates that a drastic decline has occurred, and the disease continues to spread across a substantial portion of the bat's range (NatureServe, 2019). In Virginia, winter hibernacula monitoring surveys have documented a more than 95% decline across the State. Tricolored bat is now State listed as Endangered (VDGIF 2019a; VDGIF 2019c). The proposed project area is outside of known high priority hibernacula and roost sites for tricolored bats in Virginia (VDGIF 2019b). There were no tricolored bats seen during field visits and the closest known hibernaculum to project working areas is over 20 miles away near Staunton Dam (VDGIF 2019b).

Direct, Indirect, and Cumulative Effects

The proposed prescribed burning would create forested openings, while maintaining 99% of the riparian buffers where these bats are known to forage (NatureServe, 2020). Bats could fly along stream courses easier and food sources (insects) would be indirectly increased due to more sunlight hitting the forest floor, increasing understory vegetation growth and diversity. Prescribed fire could indirectly affect tricolored bats by destroying some potential snag roosting habitat, though fire will also indirectly benefit bats via snag creation through burn mortality and through the creation of openings and thinned out understory that bats need to forage. During the dormant season when tricolored bats are in their hibernacula (caves, mines), prescribed burning should have no direct effects. Late dormant season burns or growing season burns could drive the bats out of the burn unit briefly, but they should resettle in adjacent, unburned units.

In addition, this project-level analysis incorporates direction and standards designed to benefit Indiana bats and northern long-eared bats from the Jefferson National Forest's Revised Forest and Land Resource Management Plan (Forest Plan) and Final Environmental Impact Statement (FEIS). These standards also meet the best management practices recommended by the State of Virginia for tri-colored bats (VDGIF 2016).

This species could indirectly benefit from Rx burn implementation via more efficient foraging due to reduced midstory clutter (Cox et al. 2016) and increased insect abundance and diversity. Overall, the likely outcome is no discernable impacts, ranging toward a net beneficial effect for the

tricolored bats. Therefore, there are no known impacts that should result from implementation of this project, that would adversely impact species viability or result in a trend toward federal listing of this species under the Endangered Species Act. There are no additional foreseeable activities in the area that would directly or indirectly affect the tricolored bat. Therefore, there will be no cumulative effects to the tricolored bat from the proposed project.

Determination of Effects

The determination of effect for this species for the proposed actions is, ***“may impact individuals but not likely to cause a trend to federal listing or a loss of viability”***.

Monarch

Introduction

North America is considered the core of the monarch’s range but the overall range extends through Central America into northern South America. This species can also be found on other continents and islands several of which appear to be nonnative originating from introductions. The majority North American populations are strongly migratory, overwintering in a few dozen locations in California and Mexico then spreading to the rest of the United States and Canada during the spring and summer months. Populations in south Florida and the Gulf Coast are non-migratory. The North American populations have declined significantly in the last 20 years, especially the last 10. Estimates from the overwintering sites in Mexico in 2013-2014 showed a 90% drop from the 20-year average for the eastern population. The greatest threat to this species is habitat loss in its over wintering grounds and pesticide usage (NatureServe 2020).

Milkweeds are the host plant for this species in all life stages. Most milkweeds contain cardiac glycosides which are stored in the bodies of both the caterpillar and adult. These poisons are distasteful to birds and other vertebrate predators. After tasting a Monarch, a predator might associate the bright warning colors of the adult or caterpillar with an unpleasant meal, and avoid Monarchs in the future. Adults feed on nectar from milkweeds, dogbane, lilac, red clover, lantana, thistles, goldenrods, blazingstars, ironweed, and tickseed sunflower (NatureServe 2020).

Direct, Indirect, and Cumulative Effects

Burns would be conducted in the early spring outside of the season when this habitat is utilized by monarchs so no direct effects are expected. Implementing the prescribed burns would be indirectly beneficial for this species. Burning the open areas would reduce the encroached shrubby component in the open areas making the growing conditions more favorable for the nectar producing herbaceous species favored by the monarchs.

Cumulative effects are expected to be beneficial for this species. Prescribed burning combined with mechanical and manual shrub removal would improve habitat conditions for the nectar producing herbaceous species. These food sources need open full sun conditions to thrive and reducing the shrub component would improve conditions potentially leading to a population increase for these important monarch food sources.

Determination of Effects

Implementation of the project **may impact individuals** but is **not likely to cause a trend towards federal listing** of this species because impacts would improve foraging habitat conditions.

Regal Fritillary

Introduction

The historical range of this species extended from coastal New Brunswick through the New England states south through the Ohio Valley and Southern Appalachians to Northern Georgia and west to eastern Montana. The southern limits coincided quite well with a January mean winter temperature of about 36 degrees Fahrenheit or lower and the northern limit to coincide with an annual temperature of 45 degrees Fahrenheit. Habitats are open grassy situations, ranging from xeric to hydric, completely flat to hilly. Populations require a large number of violet plants which are the sole larval foodplants. (NatureServe 2020). There are no known records of this species being present in the project area (Chazal et al 2010).

Direct, Indirect, and Cumulative Effects

Frequent prescribed fire that fully consumes the burn unit (100% burn) can reduce the local population size in the species (NatureServe 2020). However, there are no records of this species in the project area (Chazal et al 2010), and complete consumption of the burn area is unlikely due to the moist ground conditions needed to keep in burns in the burn unit boundaries. The high-country burns, especially in the units that contain bogs and wetland habitat, are more likely to be mosaic than complete preserving some larval habitat for this species if they are present in the area. Implementing the prescribed burns would be indirectly beneficial for this species. Burning the open areas would reduce the encroached shrubby component in the open areas making the growing conditions more favorable for the nectar producing herbaceous species favored by this species.

Cumulative effects are expected to be beneficial for this species. Prescribed burning combined with mechanical and manual shrub removal would improve habitat conditions for the nectar producing herbaceous species. These food sources need open full sun conditions to thrive and reducing the shrub component would improve conditions potentially leading to a population increase for these important monarch food sources.

Determination of Effects

Implementation of the project **may impact individuals** but is **not likely to cause a trend towards federal listing** because it is unlikely that this species would be present in the project area. It is possible that some individuals may be lost due to implementation of this project, but implementation would improve foraging habitat conditions.

Summary of determinations and signature of preparers

Based on the information and analysis above, the following determinations of effects were made for the activities proposed in this project.

Species	Determination
Northern Long-eared Bat	Likely to adversely affect (covered under the 4D rule)
Eastern Small-footed Bat	May affect, not likely to cause a trend toward federal listing
Tricolored Bat	May affect, not likely to cause a trend toward federal listing
Monarch	May affect, not likely to cause a trend toward federal listing
Regal Fritillary	May affect, not likely to cause a trend toward federal listing

These determinations were made by qualified staff of the George Washington/Jefferson National Forest based on the best available science and other relevant information. If new information or changed circumstances affect these determinations, forest staff will reinitiate consultation pursuant to Forest Service policies and requirements under Sect. 7 of the Endangered Species Act.

/S/ Brittany B. Phillips

Date 05-29-2020

Brittany B. Phillips, Wildlife Biologist, Mount Rogers National Recreation Area

References

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Appendix A

Determination of Threatened, Endangered or Sensitive Species Occurrences for (Prescribed Burning in the Crest Zone and Whitetop Mountain)

Coding for Occurrence Analysis Results (OAR) for 199 species

Forest updated **November 26, 2018** (based on Region 8 sensitive species list effective **March 15, 2018**)

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
VERTEBRATE										
Fish										
1	-	X	<i>Ammocrypta clara</i>	Western sand darter	Clinch R, Powell R	Aquatic-rivers.	S	G3	S1	-
1	-	X	<i>Chrosomus cumberlandensis</i>	Blackside dace	Upper Cumberland R, Upper Powell R, Poor Fk Cumberland R, Clinch R drainage - Staunton Ck McGhee Ck	Aquatic-streams.	T	G2	S1	S3 (KY)
1	-	X	<i>Erimonax monachus</i>	Spotfin chub	Lower N Fk Holston R	Aquatic-streams.	T	G2	S1	-
1	-	X	<i>Erimystax cahni</i>	Slender chub	Two sites - Powell R, Lee Co	Aquatic-rivers.	T	G1	S1	-
1	-	X	<i>Erimystax insignis</i>	Blotched chub	Clinch-Powell system, S Fk Holston R	Aquatic-streams/rivers.	S	G4	S3	-
1	-	X	<i>Etheostoma acuticeps</i>	Sharphead darter	S and Middle Fk Holston R	Aquatic-rivers.	S	G3	S1	-
1	-	X	<i>Etheostoma cinereum</i>	Ashy Darter	Upper Clinch R, Guest R gorge	Aquatic-rivers.	S	G2G3	S1	-
9	-	X	<i>Etheostoma osburni</i>	Candy darter	Big Stony Ck, Dismal Creek, Cripple Creek (New R watershed)	Aquatic-streams.	E	G3	S1	S2
1	-	X	<i>Etheostoma percnurum</i>	Duskytail darter	Copper Ck, Clinch R	Aquatic-rivers.	E	G1	S1	-
1	-	X	<i>Etheostoma denoncourtii</i>	Golden darter	Four sites Clinch R, lower Copper Ck.	Aquatic-rivers. Formerly: Tippecanoe darter, <i>Etheostoma tippecanoe</i> .	S	G3G4	S1	S2
1	-	X	<i>Etheostoma vulneratum</i>	Wounded darter	N & S Fk Holston R, Clinch R, Powell R.	Aquatic-Rivers.	S	G3	S2S3	-
1	-	X	<i>Ichthyomyzon greeleyi</i>	Mountain brook lamprey	M, N Fk Holston R, Copper Ck, Indian Ck, Clinch R, Powell R	Aquatic-rivers.	S	G3G4	S2	S1
1	-	X	<i>Notropis ariommus</i>	Popeye shiner	N Fk Holston R, Clinch R, Powell R	Aquatic-rivers.	S	G3	S2S3	S2
1	X	X	<i>Notropis semperasper</i>	Roughhead shiner	Upper James R watershed above Buchanan (Cowpasture R, Jackson R, Craig Ck)	Aquatic-rivers.	S	G2G3	S2S3	-
1	-	X	<i>Noturus flavipinnis</i>	Yellowfin madtom	Lower & Mid reaches of Copper Ck, Powell R	Aquatic-streams.	T	G1	S1	-
1	X	X	<i>Noturus gilberti</i>	Orangefin madtom	S Fk Roanoke R watershed, Roanoke R above Salem, Craig Ck, Johns Ck, Cowpasture R	Aquatic-streams.	S	G2	S2	-
1	-	X	<i>Percina burtoni</i>	Blotchside logperch	N Fk Holston R, Clinch R, Copper Ck, Little R	Aquatic-rivers.	S	G2G3	S1	-
1	-	X	<i>Percina rex</i>	Roanoke logperch	Upper Roanoke R watershed	Aquatic-rivers.	E	G1G2	S1S2	-
1	-	X	<i>Percina williamsi</i>	Sickle darter	S & N Fk Holston R above Saltville, Clinch R - lower Copper Ck.	Aquatic-rivers. Formerly: <i>Percina macrocephala</i> .	S	G2	S1S2	S2
9	-	X	<i>Phenacobius teretulus</i>	Kanawha minnow	Upper New R watershed	Aquatic-streams.	S	G3G4	S2S3	S1
Amphibian										
4	-	X	<i>Aneides aeneus</i>	Green salamander	Bland, Dickenson (Skegg Boulderfield), Lee, Russell, Scott, Tazewell, Washington, Wise, Wythe Cos VA; Greenbrier, Monroe, Pendleton Cos WV	Damp (not wet) crevices in shaded rock outcrops and ledges; beneath loose bark; in cracks of standing or fallen trees; in or under logs on ground.	S	G3G4	S3	S3
1	-	X	<i>Cryptobranchus alleganiensis</i>	Hellbender	N & S Fk Holston (Whitetop Laurel), Clinch R, Copper Ck, Powell R.	Aquatic-rivers, streams.	S	G3G4	S2S3	S2
1	-	X	<i>Desmognathus organi</i>	Northern pygmy salamander	Grayson, Smyth, Washington Cos. Whitetop Mt. and Mt. Rogers	Spruce-fir forests and adjacent northern hardwoods, >3600'	S	G3	S2	-
1	-	X	<i>Plethodon hubrichti</i>	Peaks of Otter salamander	Peaks of Otter, Apple Orchard Mtn	Mixed oak, late successional with loose rocks and logs, >1800'.	S	G2	S2	-
1	X	-	<i>Plethodon punctatus</i>	Cow Knob salamander	Shenandoah Mtn, VA & WV	Mixed oak, late successional with loose rocks and logs, >2500'.	S	G3	S2	S1
1	X	-	<i>Plethodon sherando</i>	Big Levels salamander	Big Levels, Augusta Co	Forest and rocky talas slopes 1900' – 3580'.	S	G2	S2	-
1	X	-	<i>Plethodon virginia</i>	Shenandoah Mountain salamander	Rockingham Co	Temperate forests between 3600' – 3900'.	S	G2G3	S2	SNR
1	-	X	<i>Plethodon welleri</i>	Weller's salamander	Mt Rogers & Whitetop Mtn	Spruce-fir forests and adjacent northern hardwoods.	S	G3	S2	-
Reptile										
1	X	-	<i>Clemmys guttata</i>	Spotted turtle	Maple Flats, Augusta Co	Mostly unpolluted, shallow bodies of water with a soft bottom and aquatic vegetation; small marshes, marshy pastures, bogs, fens, woodland streams, swamps, small ponds, vernal pools, and lake margins.	S	G5	S4	S1
1	X	-	<i>Glyptemys insculpta</i>	Wood turtle	Page, Rockingham, Shenandoah Cos; N Shenandoah R watershed	Along permanent streams during much of year; in summer may roam widely overland; variety of terrestrial habitats adjacent to streams, including deciduous woods, cultivated fields, and woodland bogs, marshy fields and pastures. Overwinters in streams.	S	G3	S2	S3
1	X	X	<i>Pituophis melanoleucus</i>	Pinesnake	Historic records from Alleghany, Augusta, Botetourt, Craig, Rockingham Cos., VA; Monroe Co, WV. No current records known from GWJNF.	Xeric, pine-dominated or pine-oak woodland with open, low understory established on sandy soils; require forest openings, with level, well-drained sandy soils and little shrub cover as nesting/hibernation sites.	S	G4	S1?	SH

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
Bird										
1	-	X	<i>Ammodramus henslowii</i>	Henslow's Sparrow	Pulaski Co (Radford Arsenal). No nest records known on GWJNF.	Open fields, meadows with grass interspersed with weeds or shrubby vegetation, especially in damp or low-lying areas; unmowed hayfields.	S	G4	S1B	S3B
Mammal										
1	-	-	<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat	Has not been found in VA but has occurred nearby in WV, KY, & TN. In 1978, a large nursery colony was found in Hancock Co., TN, very close to the VA-TN border. Only possible in Lee, Scott, Washington Co.	Caves in winter, large hollow trees summer, may also use cliff-lines, buildings, and bridges in summer. Not on VADCR-NHP "Rare Animal" list.	S	G3G4	-	S1
1	X	X	<i>Corynorhinus townsendii virginianus</i>	Virginia big-eared bat	Summer: VA - Tazewell Co (3 caves), Highland Co (1 cave); WV - Pendleton Co (4 caves); Winter: Highland, Rockingham, Bland, and Tazewell Cos (6 caves); Pendleton Co (6 caves). Largest VA population in Tazewell Co and largest WV population in Pendleton Co. Small numbers of bats (usually <10) in a few other widely scattered caves during summer months. Bath & Pulaski Co records are historic. No occupied caves currently known on Forest.	Resides in caves winter and summer. Short distance migrant (<40 miles) between winter and summer caves. Forages primarily on moths and foraging habitat is common (fields, forests, meadows, etc.). Forages within 6 miles of summer caves. USFWS Critical Habitat is 5 caves in WV (4 Pendleton Co and 1 Tucker Co). Closest Critical Habitat cave to GWJNF is ~3 miles in Pendleton Co, WV. OAR code of "2" used when project further than 6 miles from summer or winter occupied cave.	E	G3G4T2	S1	S2
1	-	X	<i>Glaucomys sabrinus coloratus</i>	Carolina northern flying squirrel	Mt Rogers & Whitetop area	Spruce-fir forests and adjacent northern hardwoods.	E	G5T2	S1	-
1	X	-	<i>Glaucomys sabrinus fuscus</i>	Virginia northern flying squirrel	Laurel Fork area, Highland Co	Spruce forests and adjacent northern hardwoods.	S	G5T2	S1	S2
1	-	X	<i>Myotis grisescens</i>	Gray bat	Ridge & Valley, Clinch R watershed; Russell Fk at Russell Fk/Pound R confluence.	Caves winter and summer, forages widely.	E	G3	S1	-
6	X	X	<i>Myotis leibii</i>	Eastern small-footed bat	Blue Ridge, Ridge & Valley, Cumberland Mtns	Hibernates in caves during winter, roosts in crevices of large rock outcrops, cliffs, and under large rocks in talus & boulder-fields during summer, plus similar man-made structures like rip-rap and bridges, forages widely in all forested and open habitat types over both ridges and valleys.	S	G1G3	S2	S1
6	X	X	<i>Myotis septentrionalis</i>	Northern long-eared bat	Blue Ridge, Ridge & Valley, Cumberland Mtns	Hibernates in crevices and cracks of cave walls during winter (sometimes mines & tunnels), difficult to find and rarely seen. During summer, forages widely and roosts singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Also may roost in structures like barns, sheds, & houses. Decline due to WNS.	T	G1G2	S3	S3
6	X	X	<i>Myotis sodalis</i>	Indiana bat	Blue Ridge, Ridge & Valley, Cumberland Mtns	Caves winter, upland hardwoods summer, forages widely along riparian areas and open woodlands.	E	G2	S1	S1
6	X	X	<i>Perimyotis subflavus</i>	Tricolored bat	Every county in VA, WV, KY	Caves in winter: Caves, trees, cliffs, barns during summer months. Decline due to WNS. Formally: Eastern pipistrelle.	S	G3	S1S3	
INVERTEBRATE										
Snail (Mollusk, Class Gastropoda)										
1	X	-	<i>Fontigens tartarea</i>	Organ cavesnail	Rock Camp Cave (1 mile from FS), McClung-Zenith Cave (1.5 mile from FS), Monroe Co, WV; Greenbrier, Pocahontas, Randolph, Tucker Cos, WV; Bath, Highland Cos, VA	Caves. Obligate troglobite.	S	G2	S1S2	S2
1	-	-	<i>Gastrodonta fonticola</i>	Appalachia bellytooth	No known records on GWJ. Scott and Wise Co records need to be verified.	Damp, wooded environments, particularly in deep piles of wet leaf litter and around rotting wood debris.	S	G3G4	SU	SNR
1	X	X	<i>Glyphyalinia raderi</i>	Maryland glyph	Alleghany, Montgomery Cos	Calciophile, edge of seeps within leaf litter. May burrow.	S	G2	S1S2	S2
1	X	-	<i>Helicodiscus diadema</i>	Shaggy coil	Alleghany Co	Calciophile; semi-open, calcium-rich environments, especially limestone rubble/talus and thinly wooded limestone hills.	S	G1	S1	-
1	X	X	<i>Helicodiscus triodus</i>	Talus coil	Alleghany, Botetourt, Rockbridge Cos	Calciophile, limestone rubble on wooded hillsides and near cave entrances.	S	G2	S1S2	SH
1	-	X	<i>Io fluvialis</i>	Spiny riversnail	Clinch R, N Fk Holston R	Aquatic-rivers.	S	G2	S2	-
1	-	-	<i>Paravitrea septadens</i>	Brown supercoil	Breaks Interstate Park, Dickenson Co; Buchanan Co., VA. No known records on GWJ.	Steep forested slopes and in ravines, often among woody debris, rocks, or deeper leaf litter; mixed eastern hemlock-hardwood forest, also in richer hardwood stands.	S	G1	S1	-
1	-	-	<i>Stenotrema altispira</i>	Highland slitmouth	No known records on GWJ. Grayson and Smyth Co records need to be verified.	Higher elevations, in leaf litter and woody debris.	S	G3	S1	-
1	-	-	<i>Ventridens decussatus</i>	Crossed dome	No known records on GWJ. Scott Co records need to be verified.	High elevations, usually >3000', in leaf litter, particularly oak leaves.	S	G3	SU	-
1	-	-	<i>Vertigo bollesiana</i>	Delicate vertigo	No known records on GWJ. VA and WV records need to be verified.	Leaf litter often under shrubs, on cliff-face ledges and boulder tops in mesic upland forest, and damp microsites in northern white cedar wetlands.	S	G4	SU	-
1	X	-	<i>Vertigo clappi</i>	Cupped vertigo	Greenbrier & Pendleton Cos, WV	Well-rotted, humid leaf litter and fine soil on shaded boulders, talus, ledges, and bases of forested lime-rich bedrock outcrops.	S	G1G2	SU	SNR
Mussel (Mollusk, Class Bivalvia)										
7	-	X	<i>Alasmidonta marginata</i>	Elktoe	Greenbrier R & New R, WV. Upper New R; Reed Creek; Sinking Creek (Giles Co.); Wolf Creek (Bland Co.); upper S Fk Holston; historical Upper Clinch.	Aquatic-rivers.	S	G4	S1S2	S2
1	X	-	<i>Alasmidonta varicosa</i>	Brook floater	Potomac drainage	Aquatic-rivers.	S	G3	S1	S1
7	-	X	<i>Alasmidonta viridis</i>	Slippershell mussel	Historic in Upper Clinch R excluding Copper Creek where extant; Upper S Fk Holston	Aquatic-rivers.	S	G4G5	S1	-

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	-	X	<i>Cumberlandia monodonta</i>	Spectaclecase	2 sites Clinch R	Aquatic-rivers.	E	G3	S1	-
1	-	X	<i>Cyprogenia stegaria</i>	Fanshell	Lower Clinch R, Scott Co	Aquatic-rivers.	E	G1Q	S1	S1
1	-	X	<i>Dromus dromas</i>	Dromedary pearlymussel	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers.	E	G1	S1	-
1	X	X	<i>Elliptio lanceolata</i>	Yellow lance	Roanoke R, James R	Aquatic-rivers.	T	G2G3	S2S3	-
1	-	X	<i>Epioblasma brevidens</i>	Cumberlandian combshell	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers.	E	G1	S1	-
1	-	X	<i>Epioblasma capsaeformis</i>	Oyster mussel	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers.	E	G1	S1	-
1	-	X	<i>Epioblasma florentina aureola</i>	Golden riffleshell	Restricted to lower 1.0 mile of Indian Ck to Clinch R. All other historical populations in M & Upper Tennessee R system now extirpated.	Aquatic-rivers. Formerly: tan riffleshell.	E	G1T1	S1	-
1	-	X	<i>Epioblasma torulosa gubernaculum</i>	Green-blossom pearlymussel	Clinch R, N Fk Holston R	Aquatic-rivers.	E	G2TX	SX	-
1	-	X	<i>Epioblasma triquetra</i>	Snuffbox	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers.	E	G3	S1	S2
1	-	X	<i>Fusconaia cor</i>	Shiny pigtoe	Clinch R, Powell R, N Fk Holston R, Copper Ck	Aquatic-rivers.	E	G1	S1	-
1	-	X	<i>Fusconaia cuneolus</i>	Fine-rayed pigtoe	Clinch R, Powell R, Copper Ck, Little R	Aquatic-rivers.	E	G1	S1	-
1	-	X	<i>Fusconaia masoni</i>	Atlantic pigtoe	Roanoke R, Craig Ck drainage	Aquatic-rivers.	S	G2	S2	-
1	-	X	<i>Hemistena lata</i>	Cracking pearlymussel	Clinch R, Powell R	Aquatic-rivers.	E	G1	S1	-
1	-	X	<i>Lampsilis abrupta</i>	Pink mucket	Clinch R	Aquatic-rivers.	E	G2	SX	S1
1	X	-	<i>Lampsilis cariosa</i>	Yellow lampmussel	N Fk Shenandoah R; Shenandoah, Warren Cos.	Aquatic-rivers.	S	G3G4	S2	S1
1	-	X	<i>Lasmigona holstonia</i>	Tennessee heelsplitter	Upper Clinch, N and M Fk Holston R drainages; Wolf Ck, Bland Co below Burkes Garden	Aquatic-streams.	S	G3	S1	-
1	X	-	<i>Lasmigona subviridis</i>	Green floater	Widely distributed in N & S Fk Shenandoah R, Pedlar R, James R	Aquatic-rivers.	S	G3	S2	S2
1	-	X	<i>Lemiox rimosus</i>	Birdwing pearlymussel	Clinch R, Powell R, Copper Ck, Little R	Aquatic-rivers.	E	G1	S1	-
1	X	X	<i>Parvaspina collina</i>	James spinymussel	Potts Ck, Craig Ck, Johns Ck, Patterson Run, Pedlar R, Cowpasture R, Mill Ck (Deerfield)	Aquatic-rivers. Formerly: <i>Pleurobema collina</i> .	E	G1	S1	S1
1	-	X	<i>Pegias fabula</i>	Little-winged pearlymussel	Clinch R, N Fk Holston R, S Fk Holston R, Little R	Aquatic-streams.	E	G1	S1	-
1	-	X	<i>Plethobasus cyphus</i>	Sheepnose	Clinch R, Powell R	Aquatic-rivers.	E	G3	S1	S1
1	-	X	<i>Pleurobema cordatum</i>	Ohio pigtoe	Clinch R	Aquatic-rivers.	S	G4	S1	S2
1	-	X	<i>Pleurobema oviforme</i>	Tennessee clubshell	Clinch R, Powell R, N, Middle, S Fk Holston R	Aquatic-streams.	S	G2G3	S2S3	-
1	-	X	<i>Pleurobema plenum</i>	Rough pigtoe	Clinch R	Aquatic-rivers.	E	G1	SH	SH
1	-	X	<i>Pleurobema rubrum</i>	Pyramid pigtoe	Upper Clinch R	Aquatic-rivers.	S	G2G3	SH	-
1	-	X	<i>Pleuronaia barnesiana</i>	Tennessee pigtoe	Clinch R, Powell R, N Middle, S Fk Holston R	Aquatic-rivers.	S	G2G3	S2	-
1	-	X	<i>Pleuronaia dolabelloides</i>	Slabside pearlymussel	Clinch R, M Fk Holston, N Fk Holston R	Aquatic-rivers.	E	G2	S2	-
1	-	X	<i>Psychobranthus subintum</i>	Fluted kidneyshell	Holston R., Powell R., Indian R., Clinch R., Little R., Copper Ck., Big Moccasin Ck. Critical Habitat: Indian Ck, VA: M Fk Holston R. VA: Big Moccasin Ck., VA: Copper Ck., VA: Clinch R, TN, VA: Powell R., TN, VA	Aquatic-rivers.	E	G2	S2	-
1	-	X	<i>Quadrula cylindrica strigillata</i>	Rough rabbits foot	Clinch R, Powell R, N Fk Holston R, Copper Ck	Aquatic-streams.	E	G3G4T2	S2	-
1	-	X	<i>Quadrula intermedia</i>	Cumberland monkeyface	Powell R	Aquatic-rivers.	E	G1	S1	-
1	-	X	<i>Quadrula sparsa</i>	Appalachian monkeyface	Clinch R, Powell R	Aquatic-rivers.	E	G1	S1	-
1	-	X	<i>Toxolasma lividum</i>	Purple lilliput	N Fk Holston R, Clinch R	Aquatic-rivers.	S	G3Q	SH	-
1	-	X	<i>Villosa perpurpurea</i>	Purple bean	Clinch R, Copper Ck	Aquatic-rivers.	E	G1	S1	-
1	-	X	<i>Villosa trabalis</i>	Cumberland bean	Clinch R	Aquatic-rivers.	E	G1	SX	-
Spider (Arachnid)										
1	-	X	<i>Microhexura montivaga</i>	Spruce-fir moss spider	Whitetop Mtn	Damp, well-drained moss and liverwort mats on boulders in mature spruce-fir forests.	E	G1	S1	-
Amphipod (Crustacean, Order Amphipoda)										
1	-	X	<i>Stygobromus abditus</i>	James Cave amphipod	James, Sam Bells caves, Pulaski Co; Watsons cave, Wythe Co; and other New River caves.	Aquatic-caves, water well.	S	G3	S3	-
1	-	X	<i>Stygobromus emarginatus</i>	Greenbrier Cave amphipod	Greenbrier, Monroe Cos, WV	Aquatic-caves. In caves under gravel in streambeds, occasionally in pools. Most abundant in smallest trickles of water. Primarily in tiny first and second order headwater cave streams.	S	G3	-	S3
1	X	-	<i>Stygobromus gracilipes</i>	Shenandoah Valley cave amphipod	Frederick, Rockingham, Shenandoah, Warren Cos	Aquatic-caves.	S	G3G4	S3	S1
1	X	-	<i>Stygobromus hoffmani</i>	Alleghany County cave amphipod	Low Moor cave, Alleghany Co	Aquatic-caves, groundwater habitats including springs and seeps.	S	G2	S2	-
1	X	-	<i>Stygobromus mundus</i>	Bath County cave amphipod	Alleghany, Bath Cos	Aquatic-caves.	S	G2G3	S1S2	-
1	-	X	<i>Stygobromus pollostus</i>	Least Cave stygobromid	Greenbrier, Monroe Cos, WV	Aquatic-caves.	S	G2G3	-	S3
1	-	X	<i>Stygobromus spinatus</i>	Spiny Cave stygobromid	Southern Monroe Co, north-northeast to central Pocahontas, Co, WV, primarily within the Greenbrier Valley. Covers a linear distance of ~67 miles.	Aquatic-caves. In gravels of small streams and in small cave pools.	S	G2G3	-	S2
Isopod (Crustacean, Order Isopoda)										
1	X	-	<i>Antrolana lira</i>	Madison Cave Isopod	Documented population centers in Waynesboro-Grottoes area, Augusta Co; Harrisonburg area Rockingham Co; valley of main stem of Shenandoah R, Warren, Cos,VA; Jefferson Co, WV. Not known from GWNF.	Aquatic-subterranean obligate in caves and karst groundwater.	T	G2G4	S2	S1

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	-	X	<i>Caecidotea incurva</i>	Incurved cave isopod	McCullin Cave, Smyth Co; Groseclose Cave No. 1, Wythe Co	Aquatic-caves.	S	G2G4	S2	-
1	X	X	<i>Miktoniscus racovitzai</i>	Racovitz's terrestrial cave isopod	Alleghany, Botetourt, Page, Rockbridge, Shenandoah Cos	Aquatic-caves.	S	G3G4	S2	-
Crayfish (Crustacean, Order Decapoda)										
1	-	X	<i>Cambarus callainus</i>	Big Sandy crayfish	In VA, Upper Russell Fk drainage Big Sandy R	Aquatic-streams. Fast flowing streams of moderate width. Formerly: <i>Cambarus veteranus</i> .	T	G2	S1S2	S1
Centipede (Insect, Order Chilopoda)										
1	X	X	<i>Escaryus cryptorobius</i>	Montane centipede	The Priest, Nelson Co; Whitetop Mtn, near junction of Grayson, Washington, Smyth Co	Upper soil horizon, spruce-birch forests.	S	G2	S2	-
1	-	X	<i>Escaryus orestes</i>	Whitetop Mountain centipede	Whitetop Mtn, near junction of Grayson, Washington, Smyth Co	Dark moist soil and litter, spruce-birch forests.	S	G1G2	S1S2	-
Springtail (Insect, Order Collembola)										
1	X	-	<i>Pygmarrhopalites sacer</i>	A cave springtail	Bath Co	Caves.	S	G2	S2	-
Dragonfly (Insect, Order Odonata)										
1	X	X	<i>Gomphus viridifrons</i>	Green-faced clubtail	New R, Craig Ck, Pound R, Locust Spring	Aquatic-rivers.	S	G3G4	S2	S2
7	-	X	<i>Ophiogomphus howei</i>	Pygmy snaketail	Upper New R; Carroll, Grayson, Wythe Cos	Aquatic-rivers.	S	G3	S1S2	-
Stonefly (Insect, Order Plecoptera)										
1	-	X	<i>Allocapnia fumosa</i>	Smokies snowfly	High elevation rheocrenes (flowing springs) of Mt. Rogers, Grayson, Smyth Cos.	Aquatic-streams.	S	G2	S1S2	-
1	-	X	<i>Megaleuctra williamsae</i>	Smokies needlefly	Mt Rogers & Whitetop Mtn	Aquatic-streams.	S	G2	S1S2	-
1	-	X	<i>Taeniopteryx nelsoni</i>	Cryptic willowfly	Lewis Fk & Grindstone Branch N of Mt Rogers	Aquatic-streams.	S	G1	S1	-
Beetle (Insect, Order Coleoptera)										
1	X	X	<i>Cicindela patruela</i>	Northern barrens tiger beetle	Blue Ridge, Ridge & Valley	Eroded slopes of exposed sandstone and conglomerate.	S	G3	S2	S2S3
1	-	-	<i>Pseudanophthalmus avernus</i>	Avernus Cave beetle	Endemic to Endless Caverns (commercial cave, non-FS) Rockingham Co.	Caves.	S	G1	S1	-
1	-	X	<i>Pseudanophthalmus cordicollis</i>	Little Kennedy Cave beetle	Franklins Pit, Little Kennedy Cave, Omega Cave System, Wildcat Saltpetre Cave, Wise Co., VA	Caves.	S	G1	S1	-
1	X	-	<i>Pseudanophthalmus intersectus</i>	Crossroads Cave beetle	Known only from Crossroads Cave, Millboro Springs, Bath Co.	Caves.	S	G1G2	S1	-
Scorpionfly (Insect, Order Mecoptera)										
1	-	X	<i>Brachyanorpa jeffersoni</i>	Jefferson's short-nosed scorpionfly	Sugar Run Mountain, Giles Co; Whitetop Mtn, Smyth Co.	Moist soil around seeps. Only known from high elevation. Larvae use short burrows in loose soil and moss.	S	G2	S1S2	-
Butterfly, Skipper, Moth (Insect, Order Lepidoptera)										
1	-	X	<i>Atrytone arogos</i>	Arogos skipper	Historic records, Blacksburg area. Caldwell Fields records need to be verified.	Relatively undisturbed grasslands, prairies, sand prairies, serpentine barrens, grassland/herbaceous, old field. Larval host plant; big bluestem <i>Andropogon gerardi</i> .	S	G3	SH	-
1	X	X	<i>Calephelis borealis</i>	Northern metalmark	Alleghany, Augusta, Bath, Botetourt, Craig, Lee, Montgomery, Russell, Scott Cos: Historic records from Giles, Rockbridge Cos.	Openings within forested or wooded areas, natural outcrops, shale or limestone barrens, glades or powerline right of ways. Larvae host plant; round-leaf ragwort, <i>Senecio obovatus</i> .	S	G3G4	S2S3	S2
1	X	X	<i>Callophrys irus</i>	Frosted elfin	Frederick, Montgomery, Page, Roanoke Cos.	Dry, open woods, clearings, and road/powerline ROWs with abundant wild indigo, <i>Baptisia tinctoria</i> .	S	G3	S2?	S1
6	X	X	<i>Danaus plexippus</i>	Monarch	Blue Ridge, Ridge & Valley	Mixed hardwood/conifer forest; shrubland; grassland/herbaceous; old field; suburban/orchard; cropland/hedgerow. Larval host plant; milkweeds <i>Asclepias</i> spp.	S	G4	S4	S4
6	X	X	<i>Speyeria idalia</i>	Regal fritillary	Blue Ridge, Ridge & Valley	Riparian, grasslands-shrublands. Larval host plant, violets, <i>Viola</i> spp.	S	G3	S1	S1
1	X	X	<i>Erora laeta</i>	Early hairstreak	Bedford, Botetourt, Page, Rockbridge, Warren, Wise Cos., VA; Monroe, Pendleton Cos., WV. Historic records from Giles, Montgomery Cos.	Hardwood forests or hardwood-northern conifer mixed forests. Larval host food, young fruit of American beech, <i>Fagus grandifolia</i> , nuts of beaked hazelnut <i>Corylus cornuta</i> . Canopy dweller.	S	GU	S2	S2
1	X	X	<i>Erynnis martialis</i>	Mottled duskywing	Historic records from Augusta, Bedford, Botetourt, Craig, Montgomery, Rockbridge Cos.; St. Mary's R near entrance to Wilderness Area, Augusta Co.	Open woodland; barrens; open brushy fields. Larval host plant; New Jersey tea <i>Ceanothus americanus</i> .	S	G3	S1S3	S3
1	X	X	<i>Erynnis persius persius</i>	Persius duskywing	Blue Ridge, Ridge & Valley	Bogs, wet meadows, open seepages in boreal forests. Larval host plant; lupine, <i>Lupinus perennis</i> , wild indigo, <i>Baptisia tinctoria</i> .	S	G5T1T3	S1	-
1	X	-	<i>Pyrgus centaureae wyandot</i>	Appalachian grizzled skipper	Ridge & Valley	Shale barrens, open shaley oak woodlands. Larval host plant; cinquefoil, <i>Potentilla</i> spp, strawberry, <i>Fragaria virginiana</i> .	S	G5T1T2	S1	S1
1	X	X	<i>Catocala herodias gerhardi</i>	Herodias underwing	Bald Knob, Bath Co; Poverty Hollow, Montgomery Co; Sand Mtn, Wythe Co (non FS property)	Pitch pine/bear oak scrub woodlands, >3000'. Larval host plant; oak, <i>Quercus</i> spp.	S	G3T3	S2S3	SU
1	-	X	<i>Catocala marmorata</i>	Marbled underwing	Montgomery Co	Mesic montane hardwood forests; Forested wetland, riparian. Larval host plants; willows/cottonwoods, <i>Salix/Populus</i> .	S	G3G4	S2	-
1	X	-	<i>Euchlaena milnei</i>	Milne's euchlaena moth	Warm Springs Mtn, Catawba Creek Slopes, Sweet Spring Hollow, Salt Pond Mtn. (Doe Creek)	Moist, forested slopes of mixed pine hardwoods. Acidic oak woods.	S	G2G4	S2	S2
Bee (Insect, Order Hymenoptera)										

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	X	X	<i>Bombus affinis</i>	Rusty-patched bumble bee	Bath Co, VA: new location on Warm Springs RD, Duncan Knob found 6/2017. Following VA/WV county occurrences historic (Alleghany, Carroll, Frederick, Giles, Grayson, Montgomery, Nelson, Page, Pulaski, Rockbridge, Rockingham, Wythe Cos., VA; Hardy, Hampshire, Monroe, Pendleton, Pocahontas Cos, WV).	Habitat generalist: grasslands, old field, mature woods, open woodlands, mixed farmland edges, marshes, urban areas. Feeds from a variety of plants for pollen and nectar, including flowering rhododendron and mountain laurel. Nest sites include abandoned rodent burrows, fallen dead wood, stumps. Queen only overwinters.	E	G1	SH	-
NON-VASCULAR PLANT										
Lichen										
1	-	X	<i>Alectoria fallacina</i>	Witch's-hair lichen	Smyth, Grayson Co	S. Appalachian endemic. Conifer trees, especially fir rarely on birch, in spruce-fir forests; rarely fire cherry communities.	S	G2	SH	SNR
1	-	X	<i>Gymnoderma lineare</i>	Rock gnome lichen	Whitop Mtn	Spruce-fir forests.	E	G2	S1	-
1	X	X	<i>Heterodermia appalachensis</i>	Appalachian shield lichen	St. Mary's Wilderness, Augusta Co.; Skidmore Fork, Rockingham Co.; Browns Run, Page Co.; rock outcrop, 6 mi. SE of Edinburg, Page Co.; summit of Whitop Mt, Washington Co.	Bark of hardwoods, occasionally on shaded rocks.	S	G2?	S1	-
1	-	X	<i>Heterodermia erecta</i>	A foliose lichen	Along Whitop access road, 1.2 mile from summit, Grayson Co., VA.	S. Appalachian endemic.	S	G1?	S1	-
1	-	X	<i>Hypotrachyna oostingii</i>	A foliose lichen	Mount Rogers, on Smyth, Grayson Co. line	Spruce-fir forests.	S	G2?	SU	-
1	-	X	<i>Hypotrachyna virginica</i>	Virginia hypotrachyna lichen	Mt Rogers & Whitop Mtn	Spruce-fir forests. Found on spruce, fir, rhododendron in spruce-fir and fire-cherry communities in S. Appalachian Mtns. Typically at higher elevations, has been found at lower elevations.	S	G1G2	S1	SNR
1	-	X	<i>Lecanora masana</i>	A lichen	Whitop Mtn, and Grayson, Smyth Cos	S. Appalachian endemic. Spruce-fir, northern hardwood-conifer forest.	S			
1	X	-	<i>Melanelia culbersonii</i>	Culberson's Black-parmelia	Massanutten (Fridley watershed) Rockingham Co; along trail from Wolf Gap Campground to Big Schloss, Shenandoah Co.	Rocks in open areas and on talus slopes. Fully exposed, minimally weathered quartzite and sandstone boulderfields at elevations from about 1000-3300 ft.	S	G2	S4	-
Liverwort										
1	-	X	<i>Bazzania nudicaulis</i>	A liverwort	Mt Rogers & Whitop Mtn	Bark and rock outcrops in spruce-fir forests.	S	G2G3	S?	-
1	X	-	<i>Cephaloziella spinicaulis</i>	A liverwort	Along SR 33, 10 miles W of Harrisonburg.	Damp soil in crevices of shaded sedimentary rocks, in hemlock-hardwoods forest and humid to dry faces of ledges and cliffs in open oak-hickory forest.	S	G3G4	SNR	-
1	-	X	<i>Leptosciaphus cuneifolius</i>	Wedge Flapwort	Grayson Co	Bark of Fraser fir.	S	G4G5	SH	-
1	-	X	<i>Nardia lescurii</i>	A liverwort	Blue Ridge, Ridge & Valley	Riparian - on peaty soil over rocks, usually in shade and associated with water, <3000'.	S	G3?	S1	-
1	-	X	<i>Plagiochila austinii</i>	A liverwort	Little Stony Ck - Cascades; Red Ck on Beartown Mtn	Rich, moist, densely forested ravines; shaded outcrops.	S	G3	S?	-
1	-	X	<i>Plagiochila corniculata</i>	A liverwort	Grayson, Smyth Cos	Limited to densely shaded, humid, often fog-shrouded mountain summits, usually to the spruce-fir association. Most commonly found on Fraser fir.	S	G4?	SNR	-
1	-	X	<i>Plagiochila sullivantii</i> var. <i>sullivantii</i>	A liverwort	Whitop Mtn, Salt Pond Mtn	Moist shaded rock outcrops, under cliff ledges, in crevices.	S	G2T2	SNR	-
1	X	X	<i>Plagiochila virginica</i>	A liverwort	Bath, Giles, Highland, Roanoke Cos	S. Appalachian endemic. Damp to intermittently dry calcareous or sandstone ledges or cliffs in partially exposed sites.	S	G3	SNR	SNR
1	X	X	<i>Radula tenax</i>	A liverwort	Alleghany, Amherst, Dickenson, Giles, Highland, Nelson, Smyth, Washington Cos	Moist rocks or trees in mountains below spruce-fir zone; Depressed, dense mats on moist rocks, less frequently on tree trunks, in mountainous and hilly regions. Two discrete modes of occurrence: on shaded, damp rocks, and on tree bark in deep, moist forests. Does not tolerate submersion.	S	G3G4	SU	SNR
1	-	X	<i>Sphenolobopsis pearsonii</i>	A liverwort	Mt Rogers & Whitop Mtn	Bark of Fraser fir, mountain ash, occasionally on red spruce, >5000'.	S	G2	S?	-
Moss										
1	-	X	<i>Sphagnum flavicomans</i>	Northeastern peatmoss	Whitop Mtn	Bogs, seeps.	S	G3	SU	-
VASCULAR PLANT										
1	-	X	<i>Abies fraseri</i>	Fraser fir	Grayson, Smyth Cos	S. Appalachian endemic. Spruce-fir forests, bogs >5000'	S	G2	S1	SNR
2	X	X	<i>Aconitum reclinatum</i>	Trailing white monkshood	Blue Ridge, Ridge & Valley	Rich cove sites, streambanks, seepages; all with high pH.	S	G3	S3	S3
1	-	X	<i>Actaea rubifolia</i>	Appalachian black cohosh	Lower Clinch R watershed, Scott, Wise Cos	Moist, rich wooded bluffs over limestone.	S	G3	S1	-
1	X	X	<i>Allium oxyphilum</i>	Nodding onion	Monroe, Summers, Mercer, Greenbrier Cos, WV	Shale barrens, sandstone glades.	S	G2	S1	S2
1	X	-	<i>Arabis patens</i>	Spreading rockcress	Frederick, Lee, Page, Shenandoah, Warren Cos, VA; Hampshire, Hardy, Pendleton Cos, WV	Shaded, calcareous cliffs, bluffs, and talus slopes.	S	G3	S1	S2
1	X	X	<i>Berberis canadensis</i>	American barberry	Blue Ridge, Ridge & Valley	Calcareous open woods, bluffs, cliffs, and along fencerows.	S	G3	S3S4	S1
1	-	X	<i>Betula uber</i>	Virginia round-leaf birch	One location: Cressy Ck, Smyth Co.	Riparian, mixed open forest, usually disturbed sites.	T	G1Q	S1	-
1	X	-	<i>Boechera serotina</i>	Shale barren rockcress	Ridge & Valley N of James R watershed	Shale barrens and adjacent open oak woods.	E	G2	S2	S2
1	X	-	<i>Boltonia montana</i>	Mountain doll's-daisy	Augusta Co	Sinkhole ponds.	S	G1G2	S1	-
1	-	X	<i>Botrychium jenmanii</i>	Alabama Grapefern	Russell & Wise Cos.	Open woods, old fields, pastures. Formerly: <i>Sceptridium jenmanii</i>	S	G3G4	SH	-
1	X	X	<i>Buckleya distichophylla</i>	Piratebush	Blue Ridge S of Roanoke R, Ridge & Valley S of James R	Open oak and hemlock woods.	S	G3	S2	-
1	-	X	<i>Cardamine clematidis</i>	Mountain bittercress	Blue Ridge, Ridge & Valley, S of New R watershed	Riparian, spring seeps, rocky streamsides.	S	G3	S1	-

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	X	X	<i>Carex polymorpha</i>	Variable sedge	Blue Ridge, Ridge & Valley, N of James R	Open acid soil, oak-heath woodlands, responds positively to fire.	S	G3	S2	S1
1	X	X	<i>Carex schweinitzii</i>	Schweinitz's sedge	Augusta, Bath, Highland, Montgomery, Pulaski, Washington Cos	Bogs, limestone fens, marl marshes.	S	G3G4	S1	-
1	-	X	<i>Chelone cuthbertii</i>	Cuthbert turtlehead	Blue Ridge Plateau, Grayson, Carroll Cos	Bogs, wet meadows, boggy woods and thickets.	S	G3	S2	-
1	-	X	<i>Cleistesiospis bifaria</i>	Small spreading pogonia	Craig, Dickenson, Scott, Wise Cos	Well drained, rather open, scrubby hillsides, oak-pine-heath woodlands, acidic soils.	S	G4?	S2	S1
1	-	X	<i>Clematis addisonii</i>	Addison's leatherflower	Montgomery, Roanoke, Botetourt, Rockbridge Cos	Open glades & rich woods over limestone and dolostone.	S	G1?	S2	-
1	X	X	<i>Clematis coactilis</i>	Virginia white-haired leatherflower	Ridge & Valley, Rockbridge Co, S to Wythe Co	Shale barrens, rocky calcareous woodlands.	S	G3	S3	-
1	X	-	<i>Clematis viticaulis</i>	Millboro leatherflower	Endemic to VA, only in Bath, Rockbridge Cos.	Shale barrens, open shaly woodlands.	S	G1	S1	-
1	X	X	<i>Corallorhiza bentleyi</i>	Bentley's coralroot	Alleghany, Bath, Giles Cos VA; Monroe, Pocahontas Cos WV	Dry, acid woods, along roadsides, well-shaded trails.	S	G2	S2	S1
1	X	X	<i>Delphinium exaltatum</i>	Tall larkspur	Blue Ridge, Ridge & Valley	Dry calcareous soil in open grassy glades or thin woodlands.	S	G3	S3	S2
1	X	-	<i>Echinodorus tenellus</i>	Dwarf burhead	Pines Chapel Pond, Augusta Co	Pond margins, wet depressions in sandy soil.	S	G5?	S1	-
1	X	X	<i>Echinacea laevigata</i>	Smooth coneflower	Alleghany, Montgomery Cos	Open woodlands and glades over limestone or dolomite.	E	G2G3	S2	-
4	X	X	<i>Euphorbia purpurea</i>	Glade spurge	Blue Ridge, Ridge & Valley	Rich, swampy woods, seeps and thickets.	S	G3	S2	S2
1	X	X	<i>Gaylussacia brachycera</i>	Box huckleberry	Alleghany, Bath, Bland, Carroll, Craig, Dickenson, Montgomery Cos	Dry, acidic forests, woodlands of oaks, pines, and other heaths.	S	G3	S1	S2
1	X	X	<i>Gymnocarpium appalachianum</i>	Appalachian oak fern	Alleghany, Augusta, Bath, Highland, Page, Rockbridge, Rockingham, Warren Cos	Maple-birch-hemlock woods on mountain slopes and summits, moist sandstone, talus slopes, or bouldery colluvium. Requires cool, moist microclimate, typically on north-facing slopes with cold air seepage >2000'.	S	G3	S3	S1
1	X	-	<i>Helenium virginicum</i>	Virginia sneezeweed	Endemic to Augusta, Rockingham Cos.	Seasonally dry meadows and sinkhole depressions.	T	G3	S2	-
1	X	-	<i>Helonias bullata</i>	Swamp-pink	Augusta, Nelson Cos	Sphagnum bogs, seeps, and streamsides.	T	G3	S2S3	-
1	X	-	<i>Heuchera alba</i>	White alumroot	Shenandoah Mtn	High elevation rocky woods and bluffs.	S	G2Q	S1	S2
4	X	X	<i>Ilex collina</i>	Long-stalked holly	Blue Ridge, Ridge & Valley	Bogs, seep, shrubby streamheads, >3100'.	S	G3	S1	S2
1	-	X	<i>Iliamna corei</i>	Peter's Mountain-mallow	One location: Narrows, Peters Mountain, Giles Co.	Rich, open woods along sandstone outcrops, soil pockets, fire maintained.	E	G1	S1	-
1	X	X	<i>Isotria medeoloides</i>	Small whorled pogonia	In mountains of VA known only from Bedford, Craig, and Lee Cos; other VA occurrences in Piedmont & Coastal Plain.	Open, mixed hardwood forests on level to gently sloping terrain with north to east aspect.	T	G2?	S2	S1
2	X	X	<i>Juglans cinerea</i>	Butternut	Blue Ridge, Ridge & Valley	Well-drained bottomland and floodplain, rich mesophytic forests, mostly along toeslopes.	S	G4	S3?	S3
2	X	X	<i>Liatris helleri</i>	Turgid gayfeather	Blue Ridge, Ridge & Valley	Shale barrens, mountain hillside openings. <i>L. turgida</i> synonymous with <i>L. helleri</i> .	S	GNR	S3	S2
1	-	X	<i>Lilium grayi</i>	Gray's lily	Blue Ridge, Mt Rogers & Whitetop Mtn (occurrences north of Floyd Co questionable).	Bogs, open seeps, wet meadows, grassy balds.	S	G3	S2	-
1	X	X	<i>Monotropsis odorata</i>	Sweet pinesap	Blue Ridge, Ridge & Valley	Dry oak-pine-heath woodlands, soil usually sandy.	S	G3	S3	S1
1	-	X	<i>Packera millefolium</i>	Piedmont ragwort	Lee, Scott Cos	Open limestone outcrops and cedar barrens.	S	G2	S2	-
4	X	X	<i>Parnassia grandifolia</i>	Largeleaf grass-of-Parnassus	Augusta, Bland, Giles, Grayson, Lee, Montgomery, Russell, Washington, Wythe	Fens, thinly wooded, gravelly seeps over limestone, dolomite, amphibolite, and ultramafic rocks; restricted to calcareous or magnesium-rich soils.	S	G3	S1	-
1	X	-	<i>Paxistima canbyi</i>	Canby's mountain lover	Ridge & Valley, Sarver Barrens SBA, Craig Co	Calcareous cliffs and bluffs, usually undercut by stream.	S	G2	S2	S2
1	X	X	<i>Phemeranthus teretifolius</i>	Quill fameflower	Amherst, Augusta (west side of Blue Ridge, near Laurel Springs Gap, Humpback Mtn SBA), Bedford, Carrol, Craig (Bald Mtn SBA), Grayson, Montgomery, Nelson, Page, Roanoke, Rockingham, Warren Cos, VA; Hardy & Hampshire Cos, WV	Calcareous sandstone glades, metabasalt barrens. Also <i>Talinum teretifolium</i> (Roundleaf fameflower)	S	G4	S4	S1
6	X	X	<i>Phlox buckleyi</i>	Sword-leaf phlox	Blue Ridge, Ridge & Valley	Open, often dry oak woodlands and rocky slopes, usually over shale in humus rich soils, often along roadsides.	S	G2	S2	S2
4	X	X	<i>Poa paludigena</i>	Bog bluegrass	Blue Ridge, Ridge & Valley	Shrub swamps and seeps, usually under shade.	S	G3	S2	S1
1	X	-	<i>Potamogeton hillii</i>	Hill's pondweed	Bath Co	Clear, cold calcareous ponds.	S	G3	S1	-
4	X	-	<i>Potamogeton tennesseensis</i>	Tennessee pondweed	Ridge & Valley	Ponds, back water of streams and rivers.	S	G2G3	S1	S2
6	X	X	<i>Pycnanthemum torrei</i>	Torrey's mountain-mint	Bland, Bath, Giles, Rockbridge, Wythe Cos	Open, dry rocky woods, roadsides, and thickets near streams, heavy clay soil over calcareous rock.	S	G2	S2	S1
1	X	X	<i>Scirpus ancistrochaetus</i>	Northeastern bulrush	Ridge & Valley	Mountain ponds, sinkhole ponds in Shenandoah Valley.	E	G3	S2	S1
6	X	X	<i>Scutellaria saxatilis</i>	Rock skullcap	Blue Ridge, Ridge & Valley	Rich, dry to mesic ridgetop woods, 32 counties in VA, likely G4/S4.	S	G3	S3	S2
1	-	X	<i>Silene ovata</i>	Mountain catchfly	Dickenson, Lee, Wise Cos	Rich woodlands and forests over limestone.	S	G3	S1	-
4	-	X	<i>Spiraea virginiana</i>	Virginia spiraea	Blue Ridge, Ridge & Valley, S of New R	Scoured banks of streams, riverside or island shrub thickets.	T	G2	S1	S1
1	X	X	<i>Thermopsis mollis</i>	Soft-haired thermopsis	Amherst, Bath, Bedford, Botetourt, Montgomery, Rockbridge Cos	Dry, open forests, woodlands, and clearings.	S	G3G4	S3	-
1	X	X	<i>Trifolium virginicum</i>	Kate's Mountain clover	Alleghany, Augusta, Bath, Botetourt, Craig, Frederick, Highland, Rockbridge, Rockingham, Shenandoah, Warren Cos	Shale barrens.	S	G3	S3	S3

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
6	-	X	<i>Tsuga caroliniana</i>	Carolina hemlock	Blue Ridge north to James R.	Rocky ridges and slopes, usually dry and well drained.	S	G3	S3	-
1	X	X	<i>Vitis rupestris</i>	Sand grape	Ridge & Valley	Scoured banks of rivers and streams over calcareous bedrock.	S	G3	S1	S2

LEGEND FOR TES SPECIES LIST IN OCCURRENCE ANALYSIS RESULTS:

OAR CODES:

- 1 = Project located out of known species range.
- 2 = Lack of suitable habitat for species in project area.
- 3 = Habitat present, species was searched for during field survey, but not found.
- 4 = Species occurs in project area, but outside of activity area.
- 5 = Field survey located species in activity area.
- 6 = Species not seen during field survey, but possibly occurs in activity area based on habitat observed; or field survey not conducted when species is recognizable (time of year or time of day). Therefore assume presence and no additional surveys needed.
- 7 = Aquatic species or habitat known or suspected downstream of project/activity area, but outside identified geographic bounds of water resource cumulative effects analysis area (defined as point below which sediment amounts are immeasurable and insignificant).
- 8 = Aquatic species or habitat known or suspected downstream of project/activity area, but inside identified geographic bounds of water resource cumulative effects analysis area.
- 9 = Project occurs in a 6th level watershed included in the USFWS/FS T&E Mussel and Fish Conservation Plan (August 8, 2007 U.S. Fish & Wildlife Service concurrence on updated watersheds). Conservation measures from the USFWS/FS T&E Mussel and Fish Conservation Plan applied.
- 10 = Historic records for this species only; or no known records on GWJ; or species considered extirpated from Virginia/West Virginia.

SPECIES: The term “species” includes any subspecies of fish, wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife, which interbreeds when mature (Endangered Species Act of 1973, as amended through the 100th Congress).

RANGE: The geographical distribution of a species. For use here “range” is expressed as where a species is known or expected to occur on or near the George Washington and Jefferson National Forests in terms of landform (feature name, physiographic province), political boundary (county name), or watershed (river, or stream name).

HABITAT: A place where the physical and biological elements of ecosystems provide a suitable environment and the food, cover and space resources needed for plant and animal livelihood (FSM 2605-91-8, pg. 10 of 13).

TES CODES:

T = Federally listed as Threatened
E = Federally listed as Endangered
P = Federally Proposed as T or E
S = Southern Region (R8) Sensitive species

GLOBAL RANK: Global ranks are assigned by a consensus of the network of natural heritage programs, scientific experts, NatureServe and The Nature Conservancy to designate a rarity rank based on the range-wide status of a species or variety. This system was developed by The Nature Conservancy and is widely used by other agencies and organizations as the best available scientific and objective assessment of taxon rarity and level of threat to its existence. The ranks are assigned after considering a suite of factors including number of occurrences, numbers of individuals, and severity of threats.

G1 = Extremely rare and critically imperiled with 5 or fewer occurrences or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.

G2 = Very rare and imperiled with 6 to 20 occurrences or few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range; or vulnerable to extinction because of other factors. Usually fewer than 100 occurrences are documented.

G4 = Common and apparently secure globally, although it may be rare in parts of its range, especially at the periphery.

G5 = Very common and demonstrably secure globally, although it may be rare in parts of its range, especially at the periphery.

GH = Formally part of the world's biota with the exception that may be rediscovered.

GX = Believed extinct throughout its range with virtually no likelihood of rediscovery.

GU = Possibly rare, but status uncertain and more data needed.

G? = Unranked, or, if following a ranking, ranking uncertain (ex. G3?).

G_Q = Taxon has a questionable taxonomic assignment, such as G3Q.

G_T = Signifies the rank of a subspecies or variety. For example, a G5T1 would apply to a subspecies of a species that is demonstrably secure globally (G5) but the subspecies warrants a rank of T1, critically imperiled.

STATE RANK: The following ranks are used by the Virginia Department of Conservation and Recreation to set protection priorities for natural heritage resources. Natural Heritage Resources (NHRs) are rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The criterion for ranking NHRs is the number of populations or occurrences, i.e. the number of known distinct localities; the number of individuals in existence at each locality or, if a highly mobile organism (e.g., sea turtles, many birds, and butterflies), the total number of individuals; the quality of the occurrences, the number of protected occurrences; and threats.

- **S1** - Extremely rare; usually 5 or fewer populations or occurrences in the state; or may be a few remaining individuals; often especially vulnerable to extirpation.
- **S2** - Very rare; usually between 6 and 20 populations or occurrences; or with many individuals in fewer occurrences; often susceptible to becoming extirpated.
- **S3** - Rare to uncommon; usually between 21 and 100 populations or occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.
- **S4** - Common; usually >100 populations or occurrences, but may be fewer with many large populations; may be restricted to only a portion of the state; usually not susceptible to immediate threats.
- **S5** - Very common; demonstrably secure under present conditions.
- **SA** - Accidental in the state.
- **S#B** - Breeding status of an organism within the state.
- **SH** - Historically known from the state, but not verified for an extended period, usually > 15 years; this rank is used primarily when inventory has been attempted recently.
- **S#N** - Non-breeding status within the state. Usually applied to winter resident species.
- **SR** - Reported for Virginia, but without persuasive documentation that would provide a basis for either accepting or rejecting the report.
- **SU** - Status uncertain, often because of low search effort or cryptic nature of the element.
- **SX** - Apparently extirpated from the state.
- **SZ** - Long distance migrant, whose occurrences during migration are too irregular, transitory and/or dispersed to be reliably identified, mapped and protected.
- **NA** - Not Applicable- A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

These ranks should not be interpreted as legal designations.